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Digital Exclusion: Nuances of a phenomenon which causes inequalities and compromises civic engagement in information society

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Abstract *— Digital exclusion is a phenomenon which nearly impacts all sectors of society, causes inequalities, compromises civic engagement networks and that may lead to social exclusion. This work proposes a debate about the research conducted by Celestino & Valente (2022) on digital exclusion, and aims to identify its nuances within a time period of two decades (2000-2021), as well as its involvements in social, cultural and democratic issues. The phenomenon of digital exclusion has been researched in an holistic approach and geared towards certain groups and specific contexts, but the infrastructural issue is still a major factor in the development of policies and projects for digital inclusion.*

I. INTRODUCTION

The concept of digital exclusion has developed mainly due to some publications issued from the 2000's onwards, when awareness and inclusion of variables related to technological, social and economic contexts as well as spatial aspects and individual factors led to a cycle of cause and effect which directly impacted this problem and vice versa. A synthesis of concepts points that around the 2000's, one had already realized that digital exclusion was not necessarily connected to the sole factor of having digital equipments, but rather to the equity that should have been sought after in new production models and network economy (Schwartz, 2000, quoted by Lucas, 2002).

Currently, the concept of digital exclusion indicates the impossibility for an individual to make use of the ways of social interaction of the new world (Da Silva, 2021), since a number of daily activities have migrated to the virtual environment, mainly during the pandemic of Covid-19, as we saw on the fields of Education (Coleman, 2020) and Work (Kuc-Czarnecka, 2020).

It's essential to quote Lévy (2010), for whom digital exclusion is a supplementary factor of inequalities among individuals and communities, both locally and globally. This came as a result of people realizing after some time that digital exclusion might be related to: socioeconomic differences (Lucas, 2002); lack of access to Information and Communication Technologies (ICT's) and its benefits (Pires, 2002; De Almeida et al., 2005; Grossi et al., 2013); the impossibility of cultural expression and individual identity (Rosa, 2017; Fadanelli & Porto, 2020); inequality of resources and structural issues (Knop, 2017); geographical issues (Coral, 2015); and, mainly, social exclusion (Dos Santos, 2003; Bernardes, 2010; Ragnedda & Ruiu, 2016; Helsper, 2017; Fadanelli & Porto, 2020).

In a sense, one can consider digital exclusion as a phenomenon which impacts nearly all sectors of life, bringing about more inequality and also leading to social exclusion. Bearing this in mind, it's necessary that the use

of digital technologies and networks provides a channel to express the rights of digital citizenship, as assumed by Tavares & De Souza Vieira (2020).

According to De Souza (2010, p. 271), "In the beginning of the 21st century, some technology enthusiasts, like Strover (2003) and Compaine (2001), have declared digital exclusion as outdated, or at least, nearly extinct". Around 20 years after those statements from the authors, the actual scientific literature and context prove that such a phenomenon has acquired a chronic behavior, but it can (and should) be treated, specially in minor spheres, by actions able to reach multiple directions, causes and tendencies involved on this subject, mostly the ones related to Education, Employment and Social Inequality.

This research is inside a context of accelerated process of Digital Transformation and Innovation, in which there are plenty of services, governamental included, that have been offered in the digital format. Such an act has been favored by social isolation resulting from the pandemic of the new Coronavirus (SARS-CoV-2), which causes the disease of Covid-19. As an example, distance learning has spread and been accepted as well as home office and migration of social life to the context of a network society, as previewed by Castells (1999), Jan Van Dijk (2006) and Mance (2012).

Van Dijk (2006, p. 02) states that networks are considered the "nervous system" of the present society. The reason for such is that connections surpasse geographical barriers and interconnectivity achieves a potential higher than of traditional media. Within this context, there exists a better distribution of knowledge and information in both synchronous and asynchronous ways, but at the same time the access comes from an unequal engagement of society.

Given the possibility of multilateral communication, interpersonal relations have known an increase both in quality and quantity. Therefore, these same relations have been virtualized, according to the statement of Hjarvard (2012), for whom the media can´t be separated from a vast array of institutions. For Hjarvard (2012), mediatization is equivalent to virtualization of social interactions, which are no longer real as soon as they migrate to digital and social media. As a consequence, in contemporary society, media can't be regarded as separate from culture. On the contrary, they mingle and become one thing, as an integral part of a number of diverse institutions.

This is what has been observed with the tendency of migration from communication face to face to, as an instance, communication done through instant messages applications such as Whatsapp; as well as from presential videoconferences to platforms like Zoom; from physical stores shopping to virtual apps like iFood, where you can buy since food to pharmacy and pet products; or even from CV´s given in hands to Linkedin, where one can show his/her talent, build a network, find courses or even get a job. Doing this, it's possible to perceive that virtual relations have brought agility and amplified the possibilities of social growth, becoming part of our actual culture, which was called by Lévy (2010) Cyberculture. As assumed by Tavares and De Souza Vieira (2021, p. 296):

> This new format of network society, although interconnects all people, either directly or indirectly, did not bring about a solution to social exclusion (something it can't really resolve given the complexity of the causes involved on this exclusion), but brought about visibility to another form of exclusion, the digital one, that has to be confronted by State and society [...] To overcome digital exclusion is crucial for the use of the expansion of digital citizenship, also known as Cybercitizenship, as an instrument for the strengthening and increase of political engagement, specially in the field of civic engagement.

Therefore, as widely seen in the scientific literature, an individual who does not have access to mediated or mediatized relations, whether due to availability or lack of resources to acquire digital technologies (Lucas, 2002; Knop, 2017), access to the Internet (Pires, 2002; De Almeida et al., 2005; Grossi et al., 2013), or even the skills, competencies or limiting factors to use such technologies (Padilla-Góngora et al., 2017; Kalenda & Kowalikowá, 2020; Kwiatkowska & Slórzewska-Amberg, 2020), experiences the process of digital exclusion.

The fragility of network participation may perpetuate the feeling of a group subduing another one, causing a socio-digital stratification. At this point, Bernardes (2010), in a reading of Martins (1997) and Demo (1998), agrees with the authors when they state that there is no absolute social exclusion, but rather a weakness in the participation of the poorest strata, due to the weakening of social bonds. In addition, the excluded individual loses his/her visibility which is, according to Thompson (2008, 2018), one of the main factors resulting from mediation of reality.

As a result, the lack of participation in networks can express a certain predominance of one group over another, impacting, generically and comprehensively, democratic aspects in the digital sphere and, consequently, real. In this sense, it is essential to study the impacts that digital exclusion may have on society as a whole, since digital inequalities reflect social inequality and marginalization (Knop, 2017).

The main objective of this work was to expand the research of Celestino & Valente (2022) regarding digital exclusion. We also proposed an analysis and discussion of the authors' conclusions, so that we identify the nuances of digital exclusion within the proposed time period, thus establishing the understanding of the problem over time, as well as its correlation with different social issues.

As guidelines for this research, we have raised three questions: 1) How has the concept of digital exclusion evolved or adapted since the year 2000? 2nd) What can be said of the relation between digital exclusion and social problems? 3rd) What are the possible negative impacts suffered by digitally excluded citizens nowadays?

The work by Celestino & Valente (2022) consists in an integrative literature review, which is a methodology that allows the careful and correlated grouping of works from different areas, as described by Cooper & Hedges (2009) and Greenhalg et al., (2005). The initial research by Celestino & Valente (2022) was restricted only to articles, published in Portuguese, English or Spanish in the period from 2000 to 2021, being excluded, at this stage, duplicated materials in databases or in other formats, such as: books , book chapters, simple or expanded abstracts, slides, posters and texts without indication of the place of publication.

Initially, the selected databases were: SciELO, DOAJ, REDIB, DIALNET and SCOPUS. It was considered that, despite being works originating from indexed databases, the sample could be small and limit the understanding of the topic, so the search was expanded to Google Scholar (GA). There were selected articles from indexed journals with at least one area evaluated with Qualis/CAPES A1 to B2, or whose methodological procedures had been clear and defined resulting in a sample of 19 articles.

In order to broaden the discussion and corroborate the findings of the sample, we carried out an exploratory research. The analysis of the texts sought to cover aspects such as: a topic of intersection with the digital exclusion theme; present time technological and social contexts; objective and perspective of the work.

The sample of works, data and evidence presented by Celestino & Valente (2022), comprises the following authors: Mattos (2003), Cysne et al., (2005), Sorj & Guedes (2005), Sorj & Remold (2005), Bernardes (2010), De Souza (2010), Ehlert & Bassani (2013), Grossi et al., (2013), Cruz-Cunha et al., (2014), Marques (2014), De Campos Pinheiro (2014), Godoi e Silva et al., (2017), Knop (2017), Greer et al., (2019), Kwiatkowska and Skórzewska-Amberg (2019), Faure et al., (2020), Kalenda & Kowalikowá (2020), Dos Santos et al., (2020) and Tavares & De Souza Vieira (2020).

II. COMPLEMENTARY RESEARCH

In order to "analyze and compare Internet users on a global scale, the Internet World Stats (IWS) takes a broad definition as a reference and defines an Internet user as anyone currently able to use the Internet" (IWS, 2022). From this standpoint, according to the system, there were 160,010,801 Internet users in Brazil in May 2021, which corresponds to a rate of 74.8% active users, according to IWS; approximately 257,814,274 mobile phone subscriptions as of December 15, and about 151,300,000 Facebook users as of March 2021, representing 70.7% of users.

In 2003, The Committee for the Democratization of Information Technology (CDI) launched the Digital Exclusion Map (of Brazil), prepared by the Social Policies Center (CPS) of the Fundação Getúlio Vargas (FGV), under the coordination of Neri (2003). The objective of the project was to analyze public and private digital inclusion actions, tracing a relationship between social profile and ICT's, afterwards comparing it with the hunger map in Brazil. Besides that other aspects were taken into account such as education, employment and business.

The composition of the data shown on the map was composed based on sources such as: National Household Sample Survey (PNAD/IBGE), Living Standards Survey (PPV/IGBE) and Living Conditions Survey (PCV/SEADE), among others. Also, on administrative records and research conducted in establishments, such as the Ministry of Labor and Employment (RAIS and CAGED), Industrial Research of Technological Innovation (PINTEC/IBGE) and the United Nations (UN).

In the Map of Digital Exclusion (Neri, 2003), exclusive social groups were delimited, with emphasis on racial and gender characteristics and incidence of disabilities, among others, and the government, school, employment, business and households were identified as channels of inclusion. The relationship between income and digital inclusion can be seen in the following statements of the project: "Poor people need, above all, opportunity. Opportunities today are represented by the possession of assets linked to information technology" and "[...] the long-term impact of income transfers as insurance and social leverage is comparable to that of asset transfers. Digital Inclusion leverages the effects of these policies" (Neri, 2003, p.15).

This multifaceted view of digital exclusion was dismembered by the scientific literature of the following years, which reinforced the channels of digital inclusion as valid and important for people with low economic status and social vulnerability (Grossi et al., 2013). Some data from the Continuous National Household Sample Survey (PNAD Contínua), in the fourth half of 2019, carried out

by the Automatic Recovery System (SIDRA), of the Brazilian Institute of Geostatistics (IBGE, 2022), on a total of 71,127 Brazilian households, pointed out that: 1) on the existence of a PC or Tablet in the household: PC's in 41.4% of households; Tablets, in 11.6%; and both PC and Tablet in 9.3%; 2) on the existence of a mobile phone at home: 94.4% had a mobile phone, of which 96% were in urban areas and 84.3% in rural areas; in addition, in 4% of the urban region there was no mobile phone, as well as in 15.7% of the rural region; 3) on internet use: there was internet access in 87.4% of households – 91.6% in urban areas and 61.6% in rural areas; in addition, there was no use of the internet in 12.6% of the households, among which 8.4% were in the urban area and 38.4% in the rural area; 4) on the equipment used to access the internet – PC: 45.1%, 47.9% in urban areas and 19% in rural areas; mobile phone: 99.6%, this total being from both urban and rural areas; television – 32.7%, 34.9% in urban areas and 12.9% in rural areas.

The Executive Summary ICT Households, prepared by CETIC.BR, for the year 2020, which analyzed digital environments during the first year of the pandemic, showed that the migration of activities to the digital environment caused the demand for broadband internet at home. According to survey data, in 2020 home internet access reached 83%, representing an increase of 12 points over the previous year. As for the use of the internet, 81% of the Brazilian population had access, with an increase of 7% compared to the previous year. According to the report, individuals aged 10 and over were considered, and the factor that most prevented access to internet services was cost (Pesquisa..., 2020).

Also according to the report (Pesquisa..., 2020, p. 05), it was identified "28.8 million households with Internet and without a computer; 676 thousand households with a computer and without Internet; 33 million households with computers and Internet; and 11.8 million households without computers and without Internet". Regarding the intention of use, the report points out that the search for websites with government services increased from 28% to 42%; 45% of usage was for school purposes, increased online course offerings and increased self-study.

At this point, it is worth mentioning what Sorj & Guedes (2005, p. 103) state, for whom studies concerning digital exclusion must overcome the simple and structural barrier of having equipment able to access the internet. On the other hand, Wang et al. (2021) have shown that urbanization based on ICT's, intrinsically related to infrastructural issues, is of great importance for the reduction of digital exclusion.

In light of all the above, due to the relationship between digital exclusion and a number of social issues, it is important to quote the "Sustainable Development Goals in Brazil" proposed for the 2030 Agenda of the United Nations Brazil (Nações Unidas Brasil, 2022) and addressed in Celestino & Valente (2022), highlighting, among them: 3) health and well-being, in guaranteeing access and quality for all ages; 4) education and quality, in the guarantee of inclusive and equitable education, with lifelong opportunities; 5) gender equality, with an emphasis on women's empowerment; 8) decent work and economic growth, through inclusive and sustainable growth; 9) industry, innovation and infrastructure, with increased access to ICT's and universal internet provision at affordable prices; and 10) reduction of inequalities, with the promotion of social, economic and political inclusion for all.

In relation to education, the Federal Constitution, in its art. 205 (Senado Federal, 1998), states that education is a "[...] right for all people and a duty of the State and the family, [which] will be promoted and encouraged with the collaboration of society, aiming at the full development of the person, their preparation for the exercise of citizenship and their qualification for work". Digital networks and media can act as means for the development of this collaborative integration of society, due to their potential to mediate interactions between/for all.

From the perspective that individual issues are related to social and temporal contexts, there may be an advance in research on digital exclusion if we consider that objective inequalities lead to relative exclusion and that digitally excluded individuals are aware of levels of engagement and the value of connecting with family and relatives, as well as interest groups (Heslper, 2017). In this regard, Heslper (2017) indicates the need to look at social inequalities beyond digital ones, since the axis of the issue of digital inequality lies in other adjacent factors. An in-depth look at inequalities can be seen in Da Costa (2012), where he covers a number of theoretical aspects of global and objective inequalities, among others.

Berrío-Zapata et al. (2020) has identified that digital exclusion linked to gender has not been researched in Latin America and claimed that the exclusion of women is probably linked to the model of patriarchal society that has dragged on over the years, creating a disadvantage for them in face of men in different sectors of society. In Cysne et al. (2007), the probability of a male individual accessing the internet was 32.1% higher than a woman; the United Nations University report (Sey & Hafkin, 2019) presented a study around the world to identify the gaps in internet access and digital technologies between men and women and, among the various results, it is possible to

identify that, in countries like Brazil, Costa Rica, Colombia, Jamaica and Paraguay, women use cell phones more than men.

III. CATEGORIES IMPACTED BY DIGITAL EXCLUSION

Infraestructural aspects

In relation to one of the first works analyzed - Cysne et al. (2005) - , we realized a development on the approach of the subject, which has unfolded from the inferences of structural causes within a holistic view, considering aspects such as age (Padilla-Góngora et al., 2017; Faure et al., 2020), gender (Berrío-Zapata et al., 2020), mental capacity (Greer et al., 2019), inequalities (Helsper, 2017) and network relationships and interactions that occur in the construction of Cyberculture (Lévy, 2010).

The look at digital exclusion from the infrastructural point of view, taking into account the possession of electronic equipment or internet access, may be primitive, according to Sorj & Guedes (2005), however, it should not be underestimated. The structure is the basis for the development of digital inclusion projects and policies, such as the implementation of telecenters, as seen in the works of Sorj & Remodl (2005) and Grossi et al. (2013). As seen further in Wang et al. (2021), infrastructure needs to be considered as an aspect of urban development, and should be the responsibility of the government, due to its importance and relevance in promoting digital inclusion.

Considering that there was an increase in the demand for broadband internet during the pandemic and that people with fewer resources found barriers to adapt to this reality and that mediated or mediated interactions and relationships strengthen during periods of isolation and social distancing, it is possible to infer that those individuals who did not obtain access to internet in order to remain engaged faced a triple exclusion, which includes: the social sphere, compromised at some point by the lack of communication; the technological sphere, given the social inequality; and the interactionist, mediated by the media or digital networks.

As interactions took place, for the most part, by digital means, it is considered that the cell phone has been the great ally of users to stay connected to digital life, primarily because, according to data already presented by IBGE (2022), only 4% of the households did not have a cell phone and, secondly, because the mobile phone (94.4%) exceeded the number of computers (41.4%) in the household. In addition, in 99.6% of households, internet access was via cell phones.

In this regard, we corroborate the idea of Wang et al. (2021), that mobile phones are an essential tool in the development of policies and projects to reduce digital exclusion, and we would like to mention the work of Banks (2013), in which the cell phone was used in an action to fight poverty in a community in Africa that did not have internet.

Demography

In the first works of the sample selected by Celestino & Valente (2022) (19 articles), we highlight Mattos (2003) and Cysne et al. (2005), in which the impacts of ICT on economic, social and cultural issues were observed at the global level. The digital favoring of urban centers and groups of White, Asian or people with consolidated work was evident. This, in itself, indicates the beginning of a succession of egalitarian problems and events that were built, dragged and perpetuated over the analyzed time frame. On the other hand, an optimistic result was shown in the Survey on the use of Information and Communication Technologies in Brazilian households (Pesquisa..., 2020), in which 67% of users with internet access through smartphones were black women, which indicates that changes are possible and may shed light on the discussions by Berrío-Zapata et al. (2020) on the digital exclusion by gender.

Furthermore, if we compare the results of Sorj & Guedes (2005) with the United Nations University report (Sey & Hafkin, 2019), in which there are countries where women have accessed the internet more than men — and that, as suggested by Lévy (2010), this is a trend analysis, which indicates a change in social-technical behavior — we will have a clear perception that it is possible to narrow the issues of digital exclusion, unless with regard to issues concerning access.

For Berrío-Zapata et al. (2020), gender inequality is not a factor of interest in research on digital exclusion, and the authors' point of view requires attention. A publication on the social media LinkedIn, the most popular in terms of professional careers, pointed out that it still prevails over jobs that are on the rise (LinkedIn, 2022), which certainly indicates that the topic should be researched and discussed with more interest by companies. and for all of society. For Sorj and Guedes (2005), digital exclusion is proportional to age.

This is an issue, however, that needs to be analyzed according to the characteristics of each group. If, on the one hand, children are the most excluded (Sorj & Guedes, 2005), on the other hand, the elderly are also excluded (Padilla-Góngora et al., 2017; Faure et al., 2020), given the lack skills or even age limitations. On the other hand, Vitorino et al. (2019) demonstrated that it is possible to

have good results with the use of digital technologies with the elderly, and also, according to Grishchenko (2020), they have become increasingly common to this profile of people.

It is worth mentioning that, despite being grouped in the "age" variable, the elderly can be considered more digitally excluded for reasons related to other factors, such as loss of cognitive capacity or neurodegenerative diseases, and children, due to lack of digital literacy or literacy, in addition to other factors, which, for us, leads to the need to subdivide the categories for a more detailed study.

Education, information skills and competences appropriation

With the beginning of the pandemic, education migrated to the digital context with remote teaching strategies, which increased digital exclusion, due to structural issues, as many students used the internet in schools. The literature has shown that the internet is used as a research source by many students (De Campos Pinheiro, 2014), greatly influencing their school averages. It was also evident the need and importance of teacher training for the use of ICT's (Ehlert & Bassani, 2013) and that teacher's digital exclusion may occur due to lack of mandatory use of digital technologies and excessive bureaucratization (Godoi e Silva et al., 2017).

The discussion is valid that having a device with internet access, but without a basic education, which has developed the minimum of informational skills, with the direction for the appropriate and effective use of digital technologies, can result in precarious inclusion, given that in Bernardes (2010) or it may still not be enough to solve the problem of digital inclusion, considering the skills and abilities necessary to exploit its resources.

It was also evident the relationship between education and the development of digital skills and abilities for the placement of the individual in the job market, increasing the possibilities of individual and collective growth, mainly associated with the impacts of digital exclusion in a socio-ecological model of sustainability (Eizenberg & Jabareen, 2017; Kalenda and Kowalikowá, 2020).

When it comes to competence in the use of information technologies, much more is expected than simply knowing how to browse Internet pages or exchange messages. Belluzzo (2014, 2017) expands and explores the concept of competencies with the use of the word 'CoInfo', which relates to the applicability of information in real life in different contexts. For the author (2017, p. 62), "[...] CoInfo is the one that enables people to deal with all sources of information, in the sense of organizing, filtering and selecting what is really important for decision-making in the organizational environment".

Thus, it is understood and expected that the individual can use digital technologies to access content such as training courses, curriculum banks, to apply for a vacancy, as well as to develop culturally by reading ebooks, articles and texts. And, here, it is worth mentioning that it is important that he knows how to choose quality sources, find out about the cultural program of his city, the news, as well as develop a social cycle.

The construction of competences is largely linked to education, and occurs throughout life (Belluzzo, 2017). The studies by Faure et al. (2020) on autonomy throughout life pointed out that learning can change its path and have different impacts and that individuals need access and skills to use technological tools. In this regard, Beluzzo (2014) states that learning must include the development of social and creative skills, in addition to equal opportunities for the inclusion of individuals.

The individual who does not have access to networks has their citizenship participation compromised (Tavares & De Souza Vieira, 2020), by losing the opportunity to actively participate in the new forms of interaction in the current world (Da Silva, 2021). It can be inferred that the digital exclusion poses a challenge to the development of society as a whole, especially when it comes to the view of the socioecological model, whose individual role affects the whole (Eizenberg & Jabareen, 2017; Kalenda & Kowalikowá, 2020).

In the context of Education, the study by Marcial (1999) points out that competences are developed according to the technological context and that students in the digital age have appropriated the tools and their use for communication and the selection of relevant information. For the author, competencies go through a process that involves understanding and the difference between the structure of information and knowledge. Therefore, it is necessary to ask a quality question, in order to define a good search strategy; know what you are looking for, identify the best sources and locate different resources; know how to understand, interpret and communicate their findings clearly, among others. In the current context, this is extremely important and relevant, given the exorbitant amount of information available on the internet.

Spatial and geographic

Regarding the spatial issue, the digital exclusion can occur anywhere (Bernardes, 2010), especially in isolated areas, such as rural areas. This points out that, despite several variables that permeate the theme of digital exclusion, infrastructure is a key factor for all other variables to be measured. In line with this, the 2019 data

from the IBGE (IBGE, 2022) reinforced the disadvantaged position of rural areas, in which, among the 87.4% of households with internet availability, 61.6% were from the rural area, while 91.6% were from urban areas; and among the 12.6% who did not have access to the Internet, 8.4% were from urban areas and 38.4% from rural areas.

For Salemink (2016), the concept that social exclusion leads to immediate digital exclusion needs to be revised, as it is possible to only partially agree with this idea, since individuals who inhabit a certain community, as in the case of gypsy-travelers , can be, on the one hand, excluded from the society that surrounds them, but, at the same time, they are not necessarily digitally excluded. The author carried out a study in which he involved interviews and observations of Roma groups in the Netherlands, and in it he identified that Roma (gypsy-travelers) are digitally engaged, despite their social exclusion and marginalization and low digital literacy.

Salemink (2016) pointed out that the fact that gypsy-travelers often have nomadic habits and are in different places did not hinder the digital engagement of this group of individuals. Thus, it is inferred that the spatial and geographic issue needs an analysis related to the social group in question. In this sense, one can also cite the studies by Sorj & Guedes (2005) and Sorj and Remold (2005) on digital technologies in the favelas of Rio de Janeiro, which, despite being, in a way, 'excluded' from society, they are not necessarily digitally excluded areas — they may suffer a certain aggravation of the digital exclusion due to local factors, mainly related to economic power, but not necessarily because they are close to or inserted in urban centers.

Intrapersonal characteristics

In recent literature, a concern has been identified that goes beyond infrastructural issues, and it has sought to establish a correlation between the digital exclusion and more quantitative and qualitative aspects, as suggested by Sorj & Remold (2005), such as disabilities and dependence of the elderly (Cruz -Cunha et al., 2014; Kwiatkowska and Skórzewska-Amberg, 2019), individuals with mental health problems (Greer et al., 2019) and the digital exclusion influenced by lifelong changes (Faure et al., 2020).

Regarding the elderly, such limitations are usually caused by factors linked to age, such as memory loss, motor coordination or loss of visual acuity, in addition to low literacy in digital technologies, considering that these are more common in recent generations. The lack of skills to use digital technologies leads to dependence on a third person to use them, as seen in Cruz-Cunha et al. (2014), in a municipality in northern Portugal, and Kwiatkowska and Skórzewska-Amberg (2019), in Poland.

On the other hand, the work of Vitorino Righetti & Packer (2019) shows that it is possible to work with assistive technologies to promote the inclusion of the elderly, despite the various limitations of this group of individuals. The study by Grishchenko (2020), carried out in Russia, pointed out that there is a reduction in the digital exclusion, especially for the elderly, for whom digital technologies have been increasingly common, in addition to a matter of cost reduction. of digital technology equipment, access to which is related to factors such as health and employability.

This, in a way, resolves one of the structural issues and opens the way for a qualitative treatment of the issue, thus proving the thinking of Lévy (2010), for whom there was a tendency to reduce the digital exclusion, because the cost will tend to increase less and less. In any case, the 'resolution' of the issue does not occur in a homogeneous way, but in specific groups.

It is worth reflecting here on Lévy's (2010) ideas about Cyberculture. For him, the sum of different projects carried out in different places and with specific objectives, may come to be aggregated by the convergence of the media, so that the development of collective intelligence in individual appropriation reduces the effects of exclusion caused by the technosocial movement.

The study by Padilla-Góngora et al. (2017) with people aged 65 and over identified that 57.40% were women and most of them do not have the necessary skills and competences to use ICTs, such as turning a computer on and off; use tools and programs or use basic smartphone features, such as sending messages or connecting to the internet. Here, we can see the intersection of two variables: age and sex. In addition to possible difficulties arising from age, the issue of stigma against women should also be considered (Berrío-Zapata et al., 2020), which indicates the need to analyze the issue in a multivariate or multimodal way (Cysne et al., 2007; De Queiroz Ribeiro et al., 2013), as well as relative exclusion, as seen in Heslper (2017).

Another group of people who have been of interest in research in the context of digital inclusion and exclusion are individuals with mental health problems and socialization difficulties. A WHO survey (2020) applied in 130 countries pointed out that the pandemic worsened mental health problems and that there was an increase in demand for services in this area. The data were presented at The Big Event for Mental Health (IAAP, 2020), where there was a discussion about suicide rates among young people and investment in mental health. This corroborates

the work of Greer et al. (2019), in which it can be seen that the pandemic has certainly worsened this situation, especially for those who, in addition to comorbidity(ies), may have other problems, of a socioeconomic or geographic nature.

Network participation and social inclusion: citizenship, democracy and digital culture

Ragnedda & Ruiu (2016), based on Van Dijk (2005), identified participation and social inclusion as the most important factors in combating digital inequality. According to the authors, the areas in which the digital exclusion is most noticeable are: economy, training, society, spatiality, politics and in the institutional area.

Digital technologies have brought a new form of exclusion, as the impossibility of individuals to participate in the network can mean the loss of the benefit of exercising their citizenship (Tavares & De Souza Vieira, 2020). This is perhaps one of the biggest challenges and the most worrying, since equity, voice, participation, integration are also lost, with this the individual practically does not exist in the digital realm.

Marques (2014) identified that the digital exclusion is treated along two main lines: 1st) that it is a governmental and State problem; 2nd) that it is a problem that will normalize over time. For the author, the digital exclusion depends on the context and will not be resolved only with public policies. In this regard, Sousa (2017) believes that the digital exclusion can only be eradicated through the collaboration of all people.

According to Belluzo (2014, p. 50), "[...] the contemporary currents of the knowledge society derive from two great forces: greater intercultural interaction made possible by global electronic networks and an economic system in which the functions of knowledge are related to the concept of commodity". This was widely discussed and pointed out the importance of digital inclusion in issues of participatory, socio-interactionist and socio-economic citizenship.

Although all the literature has shown the need for ICT skills, Lévy (2010) indicates that fewer and fewer skills will be needed to use information environments, whose interfaces will tend to be increasingly friendly. This can be seen in the similarity between applications, when we assimilate buttons with similar functions in different interfaces. This issue is present in the development of interfaces and reflects a concern with usability on the part of the user, as can be seen in Lowdermilk (2013) and Neil (2012).

IV. CONCLUSION

Through the analysis of the sample of articles selected by Celestino & Valente (2022), it is concluded that in general terms, the digital exclusion can be researched from the following perspectives: a) infrastructural; b) education, information skills and competences in content appropriation; c) demography; d) spatial and geographic; e) intrapersonal characteristics; f) network participation and social inclusion: citizenship, democracy and digital culture.

It is possible to verify that the digital exclusion is a cyclical and redundant phenomenon between cause and consequence, directly related to the technological structure of the moment, space and access to the internet in a ubiquitous way and that requires intrapersonal capacity, personal motivation and skills to appropriate the benefits of information and network services, being one of the edges that can contribute both to social exclusion and to the reduction of inequalities.

The same research problems reported in the older works in the sample, such as the issue of infrastructure and ICT skills, are still identified in more recent works, indicating that the problems that give rise to the digital exclusion have not yet been definitively resolved. Despite this, discussions have matured to the point of looking at digitally excluded individuals from a qualitative perspective.

Regarding the digital technologies used to access the internet, the cell phone is consolidated as a device with great potential to contribute to various digital inclusion policies, due to its low cost compared to a microcomputer, as well as its mobility, ubiquity and integration with different social media and apps.

Regarding the initial questions, it is concluded:

1st) the concept of digital exclusion evolved from the strict perspective that digital inclusion would be linked only to infrastructural issues to a level that considers qualitative, intrapersonal and socio-interactionist aspects, corroborating the perception of Helsper (2017) and being necessary, still, the articulation of the theme with theories of global and social inequalities, as seen in Da Costa (2012);

2nd) the correlation of digital exclusion with social problems is based on notes that indicate that the lack of access to education through the media can influence employability; that there is a strong relationship between the digital exclusion and gender issues with employability; that individuals with little autonomy, due to their characteristics or limiting factors, no longer have access to

the equitable purposes of the network society; and that there may be a lack of equity in the exercise of citizenship;

3rd) it can be said that a digitally excluded individual simply "does not exist" in the context of digital networks, which will deprive him of all possible benefits, including: access to education, access to employment opportunities, access to telehealth, access to government services, lack of participation in a social context. Such factors can compromise their social and egalitarian development.

It is concluded that the problem of digital exclusion can be addressed by two general lines: 1st) the group that does not have minimum structural conditions, such as conditions for acquiring devices and access to networks, also related to basic issues, such as housing and access to basic services such as energy and internet. After all, what good is having a computer or a smartphone with internet access if there is no electricity? The structural problem has been dragging on for (much) more than 20 years, and it is possible to consider it, in this sense, the first and main factor that results in the digital exclusion. With the advent of new technologies and new forms of network access, it is worth considering, according to Wang et al. (2021, p. 02) the "[…] 5G base stations, the industrial Internet of Things, artificial intelligence (AI) and data centers […] in the development of the so-called "new infrastructure" of urban centers, in order to boost economic and social development and, in a way, reduce the digital exclusion;

2nd) of the group that has the structure and minimum conditions to access the internet, which requires identifying needs by grouping and developing policies for specific groups, as in the case of the elderly, people with health problems (physical or mental), people with disabilities (PD), people of different races, from remote communities, with the intention of solving specific problems that impact the whole.

From this first classification into two large groups, it is considered that studies should not be developed under just one variable, but based on the correlation between them, and should be aggregated according to each specific context, given the complexity of the subject. For example, women have a certain percentage of digital exclusion, but this number changes and varies if other variables or covariates are considered. In this way, a black woman with mental health problems and resident of an isolated area, compared to an elderly black woman, resident of a large metropolis, would statistically be part of other simultaneous groups of digital exclusion, which can lead to the production of erroneous and inaccurate data.

It is also concluded that the digital exclusion may negatively impact several Sustainable Development Goals in Brazil for the UN 2030 Agenda (Nações Unidas Brasil, 2022), with the need, therefore, for research, development and application of strategies and policies to try to mitigate the impacts on the lives of people who cannot be inserted in a digital context, failing to enjoy its benefits, to express themselves culturally and in a citizen and, often, democratic way.

Study limitations

As this is a restricted scope by the inclusion of works on the therm "digital exclusion", works with keywords or related terms were not searched, such as "digital exclusion", "digital apartheid", "brecha digital", among others, which could (may) broaden the perspective on the topic. This is because some authors bring these therms as a synonyms and others bring it as an individual meaning. In addition, the selection and analysis of data did not consider the divisions of second and third levels of the digital exclusion, found in the literature, because it is an initial contact with the theme.

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